Knowledge Engineering for Decision Support in Osteoporosis

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Summary: There are many barriers to the diagnosis and treatment of osteoporosis. These include information and cognitive barriers such as the failure to identify that a patient is at high risk for a fragility fracture, not knowing what level of risk justifies treatment, and uncertainty about when to initiate treatment. These are some of the reasons that fewer than 25 percent of veterans who are at risk for fracture are currently treated for osteoporosis. While computerized clinical-decision support has the potential to improve appropriate treatment rates by identifying patients at risk, such systems are often poorly developed and may not reflect physicians' models for conducting clinical tasks or preferences for structuring tasks and navigating systems, thus reducing the system's optimal impact.

The overall goal of this project is to create a method for designing osteoporosis-related treatment decision support that incorporates the needs of clinicians in order to minimize cognitive burden. Dr. Lafleur and her team are using electronic and survey data to create a new risk-stratification rule. This rule will adapt a currently accepted risk-stratification rule and the World Health Organization's treatment guidelines for the veteran population, and identify information constructs that help clinicians make correct treatment decisions. These findings will inform the development and pilot testing of a new tool.

While this project is focused on a specific clinical topic and setting, its approach to providing decision support at the point of care by integrating treatment guidelines, characteristics of the target population, and information needs of clinicians, could become a decision-support template for other diseases and conditions.

Specific Aims:

- Create and validate a Veterans' Affairs (VA)-specific risk-stratification rule for fragility fractures. **(Ongoing)**
- Incorporate the risk-stratification rule into a computerized decision-support system for osteoporosis treatment. **(Ongoing)**
- Pilot the decision support tool for initiating osteoporosis treatment. **(Upcoming)**

In addition to the research project goals, Dr. LaFleur is working toward her long-term career goal of identifying and preventing drug-therapy failures in chronic disease populations. Funding from this Mentored Clinical Scientist Research Career Development Award helps Dr. LaFleur advance her skills in health services research through structured coursework, regular seminars, and mentoring in the fields of clinical informatics, decision modeling, epidemiologic methods, and statistical approaches.

2012 Activities: The development of the risk-stratification rule was completed. The dataset combines variables from four datasets including Medicare data and three VA datasets: 1) the Medical SAS Dataset, which includes all inpatient and outpatient services provided to veterans; 2) the Corporate Data Warehouse, which includes clinical patient care information from the Veteran's Health Information Systems and Technology Architecture (VistA), the VA's electronic health record; and 3) the Pharmacy Benefits Management Dataset, which includes records of prescriptions dispensed to veterans to identify drug exposures related to risk. The model incorporates outcome data from the Medical SAS dataset for fractures that were treated within the VA system, and outcome data from the Medicare-VA dataset to capture fractures that were treated outside the VA system. The next step is to validate the rule by comparing the risk estimate of the tool to the Fracture Risk Assessment Tool. To capture risk data, the project is using a group of pharmacy residents surveying patients from the Sierra Nevada region about their risk factors for fracture.

Dr. LaFleur has begun work on the second aim, which involves conducting focus groups with providers and developing a series of case vignettes to identify risk factors and fracture risk constructs that are associated with osteoporosis treatment. These fictional patient cases are designed to include information that clinicians would typically have at their disposal when seeing patients, in order to allow Dr. LaFleur to understand what kinds of clinical information are the most important when providers make decisions about osteoporosis. By the end of 2012, five of six focus groups with providers were completed.

Preliminary Impact and Findings: Dr. Lafleur and her team have developed a discriminating tool for identifying male veterans at highest risk of fracture. The tool is being used in a decision-support dashboard for osteoporosis management in the Sierra Pacific VA health care network. They have used decision analysis to test the tool for optimal thresholds of absolute risk at which patients should be treated and also to identify an optimal treatment strategy.

Target Population: Adults, Osteoporosis, Veterans

Strategic Goal: Develop and disseminate health IT evidence and evidence-based tools to improve health care decisionmaking through the use of integrated data and knowledge management.

Business Goal: Knowledge Creation
